

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 20031036	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/FI2004/000451	International filing date (day/month/year) 14.07.2004	Priority date (day/month/year) 17.07.2003
International Patent Classification (IPC) or national classification and IPC C22B3/44// C22B15:00		
Applicant Outokumpu Oyj et al		

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 3 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☒ (sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
- This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

Date of submission of the demand 13.05.2005	Date of completion of this report 11.07.2005
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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2004/000451

Box No. I Basis of the report

1. With regard to the language, this report is based on:

- ☐ the international application in the language in which it was filed
- ☐ a translation of the international application into _____,
which is the language of a translation furnished for the purposes of:
- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1 - 11 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* 13 - 14 received by this Authority on 13.5.2005
- pages* _____ received by this Authority on _____
- ☒ the drawings:
- pages 1 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI2004/000451

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-13</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-13</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-13</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Amended claims 1-13 were filed on 13 May 2005.

Document considered as being of particular relevance:

D1 US 4256553

The object of the invention is to process chemically and structurally difficult copper raw materials. A concentrate is divided into two fractions. The first fraction is leached and the solution obtained by leaching is mixed with the second fraction. Copper in the solution is converted to sulphidic form by means of the sulphide-form iron in the concentrate.

D1 (abstract; figure 1) discloses that a copper concentrate is divided into two fractions. The first fraction (12) is leached and mixed with a solid part of the second fraction containing chalcopryrite (details 14 and 54). However, the method of the invention differs from D1 in that the fraction to be processed is divided into two parts of different nature, one part that is more soluble and one part that is less soluble. Consequently, the method of claim 1 is novel with respect to D1.

The stated differences imply improvements in simplifying the processing of chemically and structurally difficult copper raw materials and to make the process more environmentally friendly. The method of claims 1-13 is considered to involve an inventive step and also to fulfil the criteria of industrial applicability.

CLAIMS

1. A method for processing concentrates, particularly concentrates produced from copper sulfide-based ores, **characterized** in that the concentrate (4) to be
5 processed, obtained from ore concentration, is divided into two sulfidic concentrates of different types, to a concentrate (7) mainly containing poorly soluble components such as the precious metals contained in the ore, and to a concentrate (8) mainly containing well soluble components, and that the concentrate (8) containing soluble components is conducted to a leaching step
10 (9), and the solution (13) obtained from said leaching step is conducted to at least one conversion step (11,16), and that in the conversion step (11) located first in the flowing direction, there is fed the concentrate (7) containing poorly soluble components, and that in the conversion step (11) that is located first in the flowing direction, at least the copper contained in the solution is converted
15 to sulfidic form by means of the sulfide-form iron of the concentrate (7) containing poorly soluble components, and that at least part of the solution (12) obtained from the conversion step (11,16) is returned to the leaching step (9).
2. A method according to claim 1, **characterized** in that in the conversion steps
20 (16) following the conversion step that is located first in the flowing direction, the different metal components are converted to sulfidic form by means of sulfide-form iron (17) fed into said conversion step.
3. A method according to claim 1 or 2, **characterized** in that the leaching (9) is
25 carried out as atmospheric leaching at the temperature of 50 – 105° C.
4. A method according to claim 1 or 2, **characterized** in that the leaching (9) is carried out as autoclave leaching.
- 30 5. A method according to any of the preceding claims, **characterized** in that the conversion step (11,16) is carried out at the temperature of 90 – 200° C.

6. A method according to claim 5, **characterized** in that the conversion step (11,16) is carried out at the temperature of 150 – 190° C.
7. A method according to any of the preceding claims, **characterized** in that the iron added in the first conversion step (11) in the flowing direction is chalcopyrite (CuFeS_2).
8. A method according to any of the preceding claims, **characterized** in that the iron added in the conversion step (16) that is next in succession after the first conversion step is troilite (FeS).
9. A method according to any of the preceding claims 1 - 6, **characterized** in that the iron added in the conversion step (16) that is next in succession after the first conversion step is pyrrhotite (Fe_{1-x}S).
10. A method according to any of the preceding claims, **characterized** in that the flotation process (19) used for producing the concentrates is controlled by means of mineral-specific electrochemical measurements.
11. A method according to any of the preceding claims, **characterized** in that the leaching step (9) used in the treatment of the concentrate is controlled by means of mineral-specific electrochemical measurements.
12. A method according to any of the preceding claims, **characterized** in that the conversion step (11,16) used in the treatment of the concentrate is controlled by means of mineral-specific electrochemical measurements.
13. A method according to any of the preceding claims, **characterized** in that in the conversion step (11) that is located first in the flowing direction, the precious metals contained in the concentrates are recovered.